AIM network

Asset Management in First Nations Finance and Open-Source Asset Management Toolkit

AFOA ATLANTIC

2022 CONFERENCE

Municipal Asset Management Program

This initiative is delivered through the Municipal Asset Management Program, which is delivered by the Federation of Canadian Municipalities and funded by the Government of Canada.

Atlantic Infrastructure Management Network

Delivered through:

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FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Government of Canada Gouvernement du Canada

Introductions

Matt Delorme

AIM Network Executive Director

Who We Are…

- A not-for-profit Community of Practice
- a network of individuals committed to AM planning for long-term sustainability of services in Atlantic Canada
- Our mandate: To guide and support infrastructure management planning for local governments in Atlantic Canada by facilitating opportunities for knowledge-sharing, collaboration and resource development

What We Do…

- Awareness building activities
- Annual conference to bring communities together
- In-person and on-line training and education
- Assist with Asset Management Funding Applications
- Provide practical (technical) support
- Advocacy and consultation with provincial and federal agencies

Food for thought…

Asset Management Goals:

- Ensure services and quality of life for future generations
- Adapt to changing community needs and changes in environment
- Consult with community on service decisions
- Live as part of nature, not above or below it
- Consider full systems with infrastructure decisions

What is the most critical change needed in how we deliver services today?

Asset Management Key Points

- Community service delivery
- Big picture thinking
- Long-term sustainability and resilience
- Fiscal decisions
- Continuous Improvement

Asset Management – Three Pillars

- What is the likelihood of failure?
- What is a “failure”?
- How bad is it if it fails?

- Number of watermain breaks / year
- Frequency of boil water orders
- Road condition
- Average age of housing
- WWTP discharge quality
- Frequency of power outages
- Time to services without a car

- Lower Risk – Higher Cost

- Improved Service = Higher Cost

AIM network

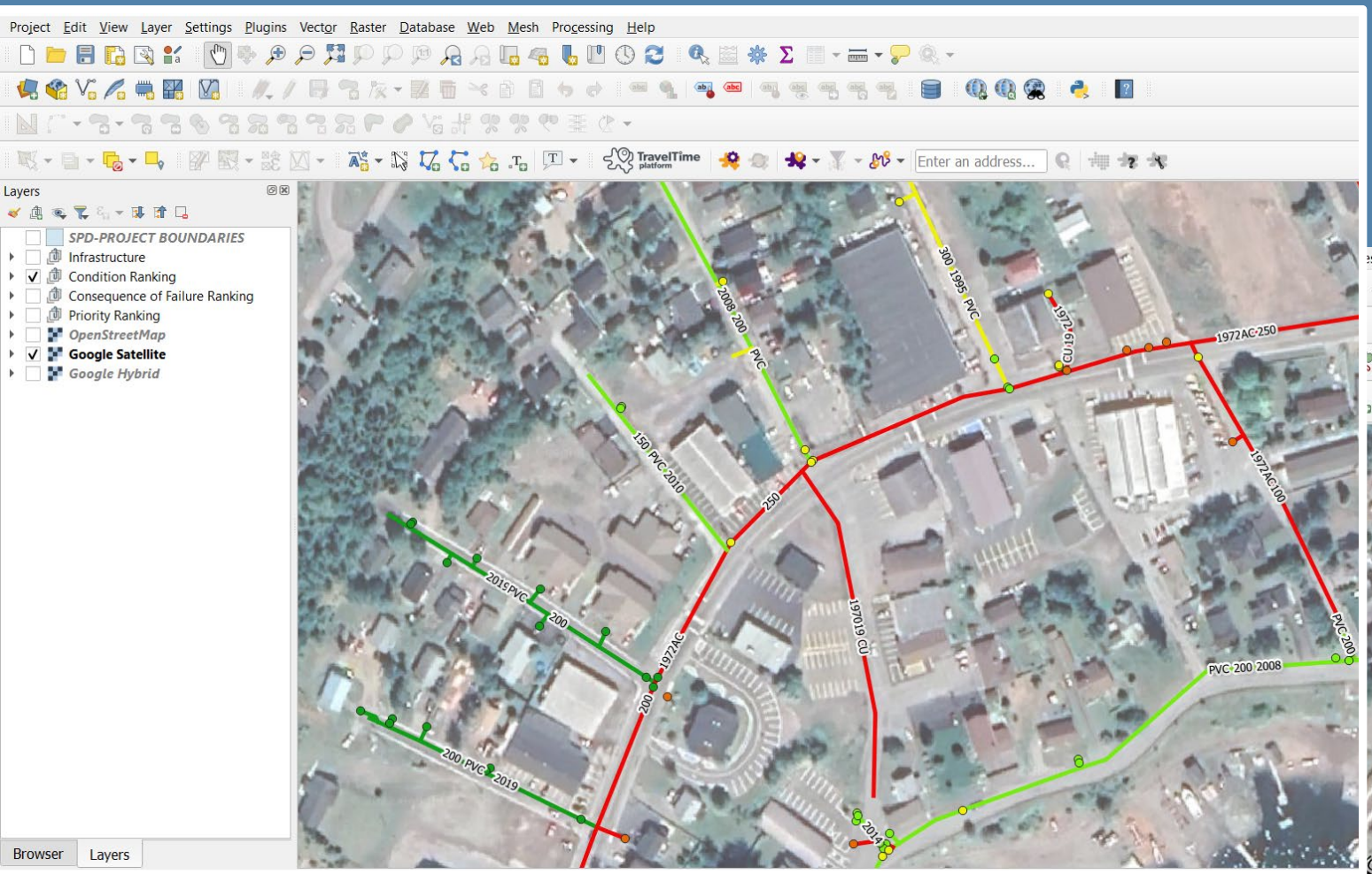
How can asset management help?

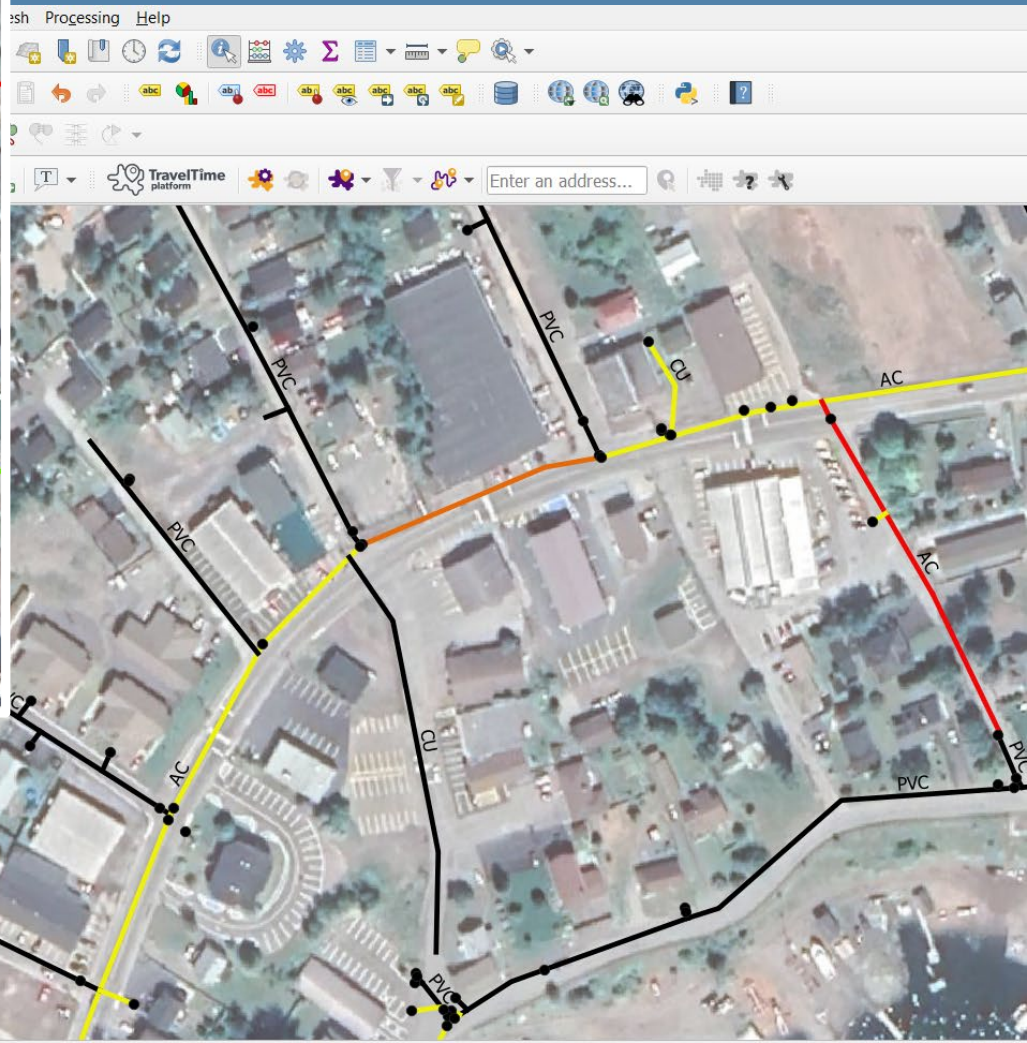
1. Common language for diverse needs
2. Plan for current and *future* needs, mitigate risks, funding strategies
3. Incorporate future liabilities (PSAB 3260, 3270, 3280) into planning
4. Measure progress toward equal access to services
5. Support funding applications
6. Decisions based on evidence
7. Better community understanding of infrastructure

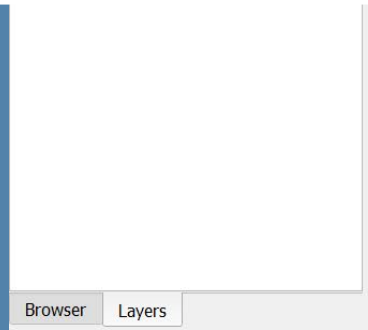
Asset Management Open-Source Toolkit

Inventory and Mapping

QGIS – Mapping and Data Collection







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FACILITIES SPREADSHEET

Data Entry Table

Level 2 Group Elements	Type	Description	Lookup	Quantity	Unit	Rate	Replacement Cost	Life Expectancy (Yrs.)
Foundations								
Standard Foundations	Standard		Standard Foundations_Standard	3,840	SF	$ 20.00	$ 76,800	100
Special Foundations	Standard	NA	Special Foundations_Standard		SF	$ 8.50	$ -	100
Slab on Grade	Standard	NA	Slab on Grade_Standard		SF	$ 9.00	$ -	100
Basement Construction								
Basement Excavation	Standard	NA - 2 story built up from ground	Basement Excavation_Standard		CF	$ 7.00	$ -	100
Basement Walls	Standard	NA	Basement Walls_Standard		SF	$ 50.00	$ -	80
Superstructure								
Floor Construction	Standard	NA	Floor Construction _Standard		SF	$ 17.00	$ -	50
Roof Construction	Standard	NA	Roof Construction_Standard		SF	$ 20.00	$ -	50
Exterior Closure								
Exterior Walls	Standard	Vinyl Siding	Exterior Walls_Standard	6960	SF	$ 65.00	$ 452,400	50
Exterior Windows	Standard	5	Exterior Windows_Standard	80	SF	$ 40.00	$ 3,200	20
Exterior Doors	Standard	9 mandoors, 6 overhead doors	Exterior Doors_Standard	460	SF	$ 7.00	$ 3,220	20
Roofing								
Roof Coverings	Standard	Aluminum roof	Roof Coverings_Standard	3840	SF	$ 15.00	$ 57,600	20
Roof Openings	Standard	1 ventillation for washrooms	Roof Openings_Standard	1	SF	$ 25.00	$ 25	25
Interior Construction								
Partitions	Standard		Partitions_Standard	6960	SF	$ 30.00	$ 208,800	50
Interior Doors	Standard	4 upstairs, 3 downstairs, 1 in boat garage	Interior Doors_Standard	160	SF	$ 7.00	$ 1,120	50
Specialities	Standard	NA	Specialities_Standard		SF	$ 25.00	$ -	50

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Data Entry Table

Component Name	Description	Replacement Cost	Life Expectancy (Yrs.)	Annual Maintenance Cost	Condition	Consequence of Failure
3 Utility Vehicle (Jeep Compass), VIN: 3C4NJDBB9JT3	Year: 2018, Fuel: Gas, Plate: R28342, MVI Expiry: April-21-2020, Reg. Expiry: May-20-2020	$ 26,700	10	1500	1	1
11-15 Utility Vehicle (Ford Escape)	Year: 2015, Fuel: Gas, Plate: R28115, MVI Expiry: August-20-2020, Reg. Expiry: August-21-2020	$ 28,500	10	1500	3	1
20-17 Work Truck (Dodge 1500)	Year: 2017, Fuel: Gas, Plate: R27023, MVI Expiry: June-20-2020, Reg. Expiry: October-01-2020	$ 60,160	10	1500	2	1
21-15 Work Truck (F-150)	Year: 2015, Fuel: Gas, Plate: R27067, MVI Expiry: October-20-2020, Reg. Expiry: November-21-20	$ 60,160	10	1500	3	1
22-09 Work Truck (Dodge 1500)	Year: 2009, Fuel: Gas, Plate: R22526, MVI Expiry: July-20-2020, Reg. Expiry: October-20-2020	$ 60,160	10	1500	5	1
23-13 Work Truck (F-150)	Year: 2013, Fuel: Gas, Plate: R21105, MVI Expiry: June-20-2020, Reg. Expiry: December-20-2020	$ 60,160	10	1500	4	1
24-10 Work Truck (Dodge 1500)	Year: 2010, Fuel: Gas, Plate: R20025, MVI Expiry: August-20-2020, Reg. Expiry: October-20-2020	$ 60,160	10	1500	5	1
25-17 Work Truck (Dodge 1500)	Year: 2017, Fuel: Gas, Plate: R28298, MVI Expiry: July-20-2020, Reg. Expiry: September-21-2020	$ 60,160	10	1500	2	1
26-13 Work Truck (F-150)	Year: 2013, Fuel: Gas, Plate: FTY727, MVI Expiry: August-20-2020, Reg. Expiry: August-21-2020	$ 60,160	10	1500	4	1
27-06 Work Truck (Dodge 1500)	Year: 2006, Fuel: Gas, Plate: R25572, MVI Expiry: February-22-2020, Reg. Expiry: October-20-202	$ 60,160	10	1500	5	1
28-15 Work Truck (Dodge 1500)	Year: 2015, Fuel: Gas, Plate: FRS164, MVI Expiry: August-20-2020, Reg. Expiry: September-21-20	$ 60,160	10	1500	3	1
29-18 Work Truck (Dodge 1500)	Year: 2018, Fuel: Gas, Plate: R23396, MVI Expiry: June-21-2020, Reg. Expiry: October-20-2020	$ 60,160	10	1500	2	1
30-14 Work Truck (Dodge 2500)	Year: 2014, Fuel: Gas, Plate: R24726, MVI Expiry: November-20-2020, Reg. Expiry: February-20-2	$ 70,000	10	1500	3	1

Asset Management Open-Source Toolkit

Level of Service

Level of Service Report

Service Characteristic	Indicator	Performance Gap	Describe Performance Gap to be Addressed	Sustainability Gap	Describe Sustainability Gap to be Addressed
Potable Water					
Safety	Water supply is sufficient for firefighting purposes	YES	provide fire protection and more consistent water supply to homes above current reservoir level	Reservoirs were built at optimal elevation for the existing residential development	New reservoir will be built above the existing reservoir to provide domestic service and fire protection high elevation residential developments
Quality	Water service pressure is adequate at customer connections	YES	customer driven complaints for perceived lack of adequate pressure	Meeting the prescribed water service pressure range	Meeting the prescribed water service pressure range
Wastewater					
Capacity / Availability	Treatment capacity is adequate for peak flow	NA		No	
Safety	Backups or overflows do not impact buildings	YES	Stormwater ingress to sanitary sewer	a few old streets where stormwater and sanitary sewer are combined	new pipe for stormwater separation
Reliability	Effluent quality is consistently within regulatory limits	NA		No	
Environmental	Providing the service generates a low environmental impact	YES	occassional overflow due to stormwater infiltration	a few old streets where stormwater and sanitary sewer are combined	eliminating cross-connections with sanitary sewer and stormwater
Urban Stormwater (Drainage)					
Safety	Buildings are protected against flooding	YES	Overland flooding due to tributary water flow affected by tidal river	YES	Mill Brook flows into Cornwallis River, at perfect storm, high tide and large runoff, flooding occurs
Solid Waste					
General Transportation					
Capacity / Availability	The cycling network, if a applicable, is well connected and accessible for all ages and abilities MOVE TO RECREATION	YES	linkages between parts of cycling network	YES	The AT plan addresses the part of the network which do not connect
Capacity / Availability	The capacity of the road network is adequate for all modes of transportation	YES	Left turns out of Business Park are problematic at peak time	YES	Centre turning lane on Park Street

Asset Management Open-Source Toolkit

Risk Assessment

How Bad is “Bad”?

Consequence of Failure Assessment Matrix						
RISK LEVEL	RANK	SOCIAL / CULTURAL / POLITICAL	ECONOMIC	LEGAL	SAFETY	ENVIRONMENTAL
INSIGNIFICANT	1	Public will not notice. No impact to cultural resources or groups. No impact to relations with other levels of government.	Costs are minor and expected within ongoing operational budget.	No regulatory or legal impacts.	No risk to safety above baseline conditions.	No impact to the environment.
MINOR	2	Minor public notice, public contacts municipality - single point of contact. Interruption of service less than 8 hour(s) No impact to cultural resources or cultural groups. No impact to relations with other levels of government.	Unexpected operational cost can be accommodated by redistribution of yearly budget.	Failure may result in small claims.	Risk of "near miss" incidents, low risk of injury.	Short term effects to the environment requiring one time remediation of mitigation to restore the system to its original state.
MODERATE	3	Moderate public notice - multiple single points of contact, few repeat contacts. Interruption of service 8 hours to 12 hours. Coverage in local news, requires official municipal response. Cultural resources threatened but not destroyed, impact to cultural groups limited.	Property damage less than $1000. Unexpected operational cost requires cancellation of minor planned activities accommodate. No long term financial impacts. Minor impact to tourism.	Failure may result in litigation and informal inquiry.	More unlikely than likely to cause short or long term injury, no risk of loss of life.	Short term effects to the environment requiring temporary remediation or mitigation which restore the system to its original state.
MAJOR	4	Potential for injury. Public notice is widespread, large volume of multiple contacts. Interruption of service greater than 1 day. Coverage in provincial news. Cultural resources may be unrecoverable. Impact to cultural groups widespread.	Property damage greater than $1000 but less than $5000X. Unexpected operational cost requires cancellation of major planned activities to accommodate. Long term financing required to accommodate. Loss of commericial or tourism service greater than 5 days.	Failure may result in class action litigation and formal inquiry.	More likely than not to cause short or long term injury, low potential for loss of life.	Long term effects to the environment requiring sustained remediation or mitigation. System may not ultimately reach its original state.
CATASTROPHIC	5	Potential for loss of life. Interruption of service greater 1 day to 1 week.	Property damage greater than $5000. Loss commercial or tourism service greater than a season. Financing requirements may render the municipality insolvent.	Failure results in contravention of laws, significant litigation, court action and multiple litigations.	More likely than not to cause short or long term injury, potential for loss of life.	Permanent or long term environmental effects that cannot be remediated or mitigated.

Refining Risk

Table 5-2: Condition Assessment Categories

MORE ACCURACY ↓

Level	Assessment Strategy	Notes
1	Preliminary (Age Based)	Condition determined by Age / Expected Useful Life Condition = Probability of Failure
2	Anecdotal Reports from Staff	Based on undocumented historical rates of failure
3	Known Site Conditions	Adjustments to condition based on ground conditions, soil corrosion rates, water chemistry, etc.
4	Visual Assessment	Operator or trained staff inspection using consistent, documented, non-intrusive visual assessment of infrastructure
5	Data Based Operations Reports	Operator or trained staff assessment using consistent, documented, operations data
6	Engineering Assessment	Inspection and reporting by a certified professional in the field
7	Life Cycle Cost Assessment of Repair, Rehabilitate or Replace	A detailed engineering study of the cost / benefit analysis of extending the life with repairs, partial system rehabilitation or full replacement

↑ LOWER COST

Table 5-3: Condition Assessment by Risk Class

Condition Assessment Category	Risk Class / Description
Level 1	Very Low to Low risk. Age is less than 50% of expected useful life, no operational issues identified. Consequence of Failure 3 or lower.
Level 2	Low to Medium risk. Age is greater than 50% of expected useful life. Failure mode has occurred at least once in the past.
Level 3	Medium to High risk. Age is greater than 50% of expected useful life. Historical experience, construction data, geotechnical reports or other information has identified a site condition that could impact the effective life of the asset. Cost of replacement is less than 10% of average annual capital budget.
Level 4	Medium to Extreme risk. Age is greater than 50% of useful life. Consequence of Failure is greater than 3. Assets are accessible for visual assessment. Assessment is conducted using a standardized visual inspection guide and record form. Cost of replacement is less than 25% of average annual budget.
Level 5	Medium to Extreme risk. Operations and maintenance data is documented against target performance. Qualified individual (operator, vendor representative or consultant) is monitoring the performance data against expected performance. There is a documented predictive maintenance framework to link probability of failure to performance data.
Level 6	Medium to Extreme risk. Age is greater than 90% of expected useful life. Cost of engineering study is less than 10% of the anticipated project construction cost.
Level 7	High to Extreme risk. Significant cost savings could be realized by assessing life cycle performance or novel technologies for extending the asset life. Operational cost represents a significant portion of the asset life cycle cost.

Ranks		Consequence				
		1	2	3	4	5
Probability	1	1	3	6	10	15
	2	2	5	9	14	19
	3	4	8	13	18	22
	4	7	12	17	21	24
	5	11	16	20	23	25

Asset Management Open-Source Toolkit

Climate Vulnerability Assessment

Identification

1. Refer to your Level of Service Workbook for service areas and supporting assets
2. Gather regional and local climate change information
3. Identify climate change impacted service areas
4. Identify risks to levels of service from climate change impacts

Assessment

7. Determine how level of service will change under a changing climate
8. Enter a specific service disruption from climate change

Strategies

9. Identify strategies to close service gaps from climate change
10. Assign order of magnitude costs to the adaptation activities
11. Assign order of magnitude costs to the "do nothing" option
12. Enter costs into the "Loss Avoided Analysis"

Management

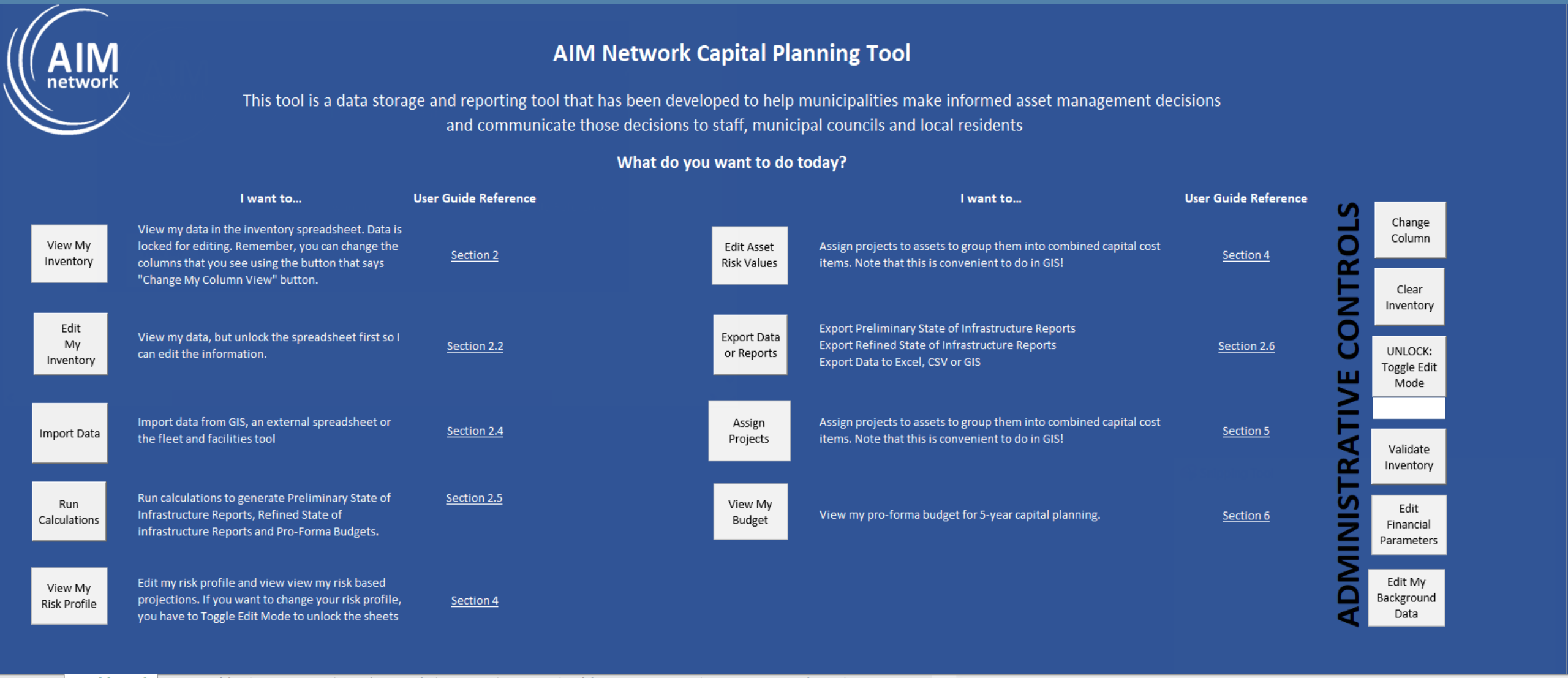
13. Select actions with positive "Loss Avoided" percentages
14. Prioritize from highest "Loss Avoided" percentage to lowest
15. Integrate actions into Asset Management Planning
16. Monitor progress and explore opportunities for continuous improvement

Climate Adaptation Workbook

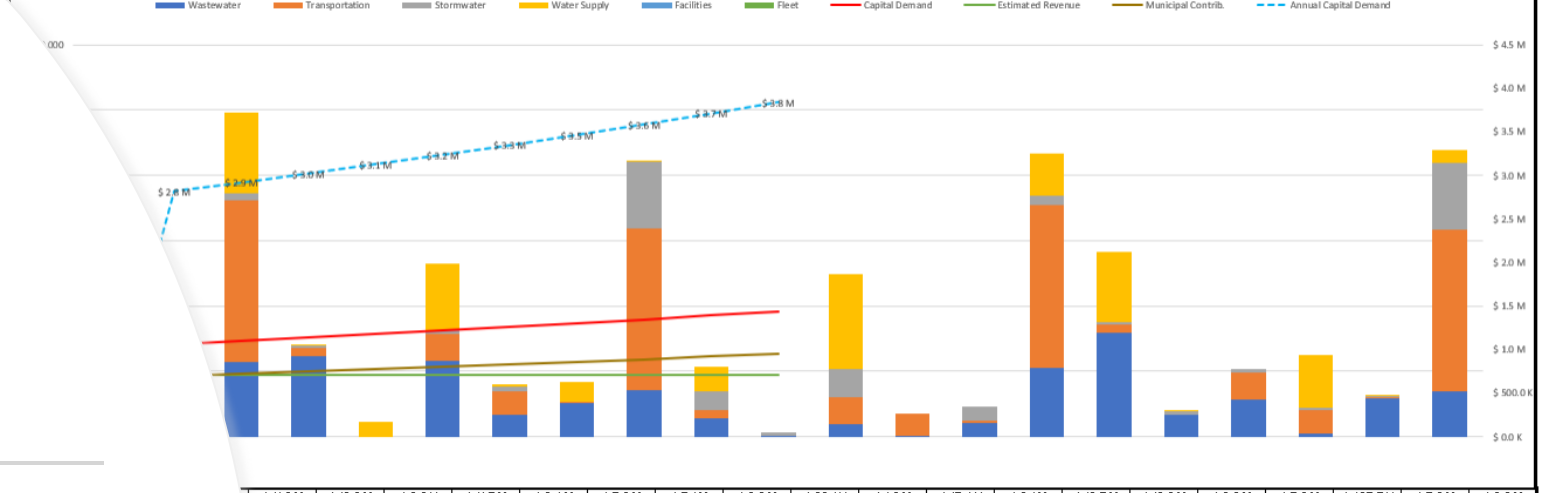
Asset Management Open-Source Toolkit

Prioritizing and Planning

Prioritizing:
AIM Capital Planning Tool



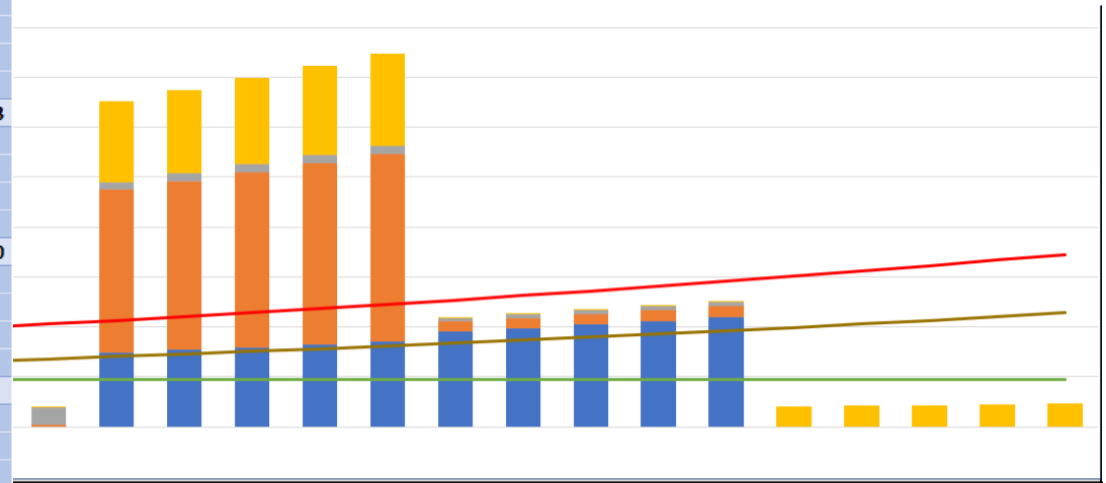
Deficit Projections and Capital Planning



$ 11.3 M	$ 12.3 M	$ 0.0 K	$ 11.5 M	$ 3.4 M	$ 5.0 M	$ 7.1 M	$ 2.8 M	$ 39.1 K	$ 1.9 M	$ 17.4 K	$ 2.1 M	$ 10.5 M	$ 16.0 M	$ 3.3 M	$ 5.6 M	$ 427.7 K	$ 5.8 M	$ 6.9 M
$ 24.8 M	$ 1.2 M	$ 0.0 K	$ 4.1 M	$ 3.6 M	$ 245.4 K	$ 24.8 M	$ 1.2 M	$ 0.0 K	$ 4.1 M	$ 3.6 M	$ 245.4 K	$ 24.8 M	$ 1.2 M	$ 0.0 K	$ 4.1 M	$ 3.6 M	$ 245.4 K	$ 24.8 M
$ 1.1 M	$ 406.7 K	$ 0.0 K	$ 608.2 K	$ 739.6 K	$ 0.0 K	$ 10.1 M	$ 3.0 M	$ 595.7 K	$ 4.3 M	$ 0.0 K	$ 2.2 M	$ 1.5 M	$ 290.2 K	$ 494.0 K	$ 562.8 K	$ 431.6 K	$ 100.0 K	$ 10.1 M
$ 10.2 M	$ 324.5 K	$ 3.0 M	$ 99.9 K	$ 3.8 M	$ 0.0 K	$ 14.4 M	$ 0.0 K	$ 0.0 K	$ 6.6 M	$ 10.7 M	$ 229.6 K	$ 0.0 K	$ 8.1 M	$ 257.1 K	$ 2.0 M			
$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K
$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K
$ 26.4 M	$ 8.0 M	$ 8.3 M	$ 42.1 M	$ 10.8 M	$ 634.8 K	$ 24.8 M	$ 3.6 M	$ 4.6 M	$ 43.4 M	$ 28.2 M	$ 4.0 M	$ 10.3 M	$ 12.5 M	$ 6.4 M	$ 43.9 M			

Year 21-25	Year 26-30	Year 31-35	Year 36-40	Year 41-45	Year 46-50	Year 51-55	Year 56-60	Year 61-65	Year 66-70	Year 71-75	Year 76-80	Year 81-85	Year 86-90	Year 91-95	Year 96-100
$ 16.2 M	$ 16.7 M	$ 17.3 M	$ 17.9 M	$ 18.5 M	$ 19.2 M										
$ 3.2 M	$ 3.3 M	$ 3.5 M	$ 3.6 M	$ 3.7 M	$ 3.8 M										
$ 9.5 M	$ 9.5 M	$ 9.5 M	$ 9.5 M	$ 9.5 M	$ 9.5 M										
$ 9.5 M	$ 9.5 M	$ 9.5 M	$ 9.5 M	$ 9.5 M	$ 9.5 M										
$ 10.7 M	$ 11.0 M	$ 11.4 M	$ 11.8 M	$ 12.2 M	$ 12.7 M										

Sum of Asset Renewal Cost	2022/2023	2023/2024	2024/2025	2025/2026	2026/2027	Grand Total
Kempt Street Sewer Separation				**$460,305.40**		**$460,305.40**
Waste Water				$260,383.41		$260,383.41
Transportation				$199,921.99		$199,921.99
Brunswick Street Sewer Separation	**$2,493,756.13**					**$2,493,756.13**
Water Supply	$497,473.91					$497,473.91
Waste Water	$636,550.65					$636,550.65
Transportation	$612,941.57					$612,941.57
Stormwater	$746,790.00					$746,790.00
Chestnut Street Storm Sewer Installation		**$1,531,375.53**				**$1,531,375.53**
Water Supply		$298,445.98				$298,445.98
Waste Water		$425,317.70				$425,317.70
Transportation		$391,436.86				$391,436.86
Stormwater		$416,175.00				$416,175.00
Elm & Cann Street Sewer Replacement			**$1,737,771.20**			**$1,737,771.20**
Water Supply			$333,240.34			$333,240.34
Waste Water			$569,643.18			$569,643.18
Transportation			$318,970.18			$318,970.18
Stormwater			$515,917.50			$515,917.50
Parade Street sewer separation (Armories to Clements Ave)				**$874,791.03**		**$874,791.03**
Waste Water				$358,256.63		$358,256.63
Transportation				$216,609.40		$216,609.40
Stormwater				$299,925.00		$299,925.00
Pleasant St Storm Sewer Separation (Albert to Argyle)					**$891,727.17**	**$891,727.17**
Water Supply					$90,325.97	$90,325.97
Waste Water					$314,477.38	$314,477.38
Transportation					$223,268.82	$223,268.82
Stormwater					$263,655.00	$263,655.00



$ 16.4 K	$ 3.0 M	$ 3.1 M	$ 3.2 M	$ 3.3 M	$ 3.4 M	$ 3.8 M	$ 4.0 M	$ 4.1 M	$ 4.2 M	$ 4.4 M	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K		
$ 62.4 K	$ 6.5 M	$ 6.8 M	$ 7.0 M	$ 7.2 M	$ 7.5 M	$ 389.2 K	$ 402.8 K	$ 416.9 K	$ 431.5 K	$ 446.6 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K		
$ 702.9 K	$ 297.0 K	$ 307.4 K	$ 318.2 K	$ 329.3 K	$ 340.8 K	$ 127.1 K	$ 131.5 K	$ 136.1 K	$ 140.9 K	$ 145.8 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K		
$ 28.4 K	$ 3.2 M	$ 3.3 M	$ 3.4 M	$ 3.6 M	$ 3.7 M	$ 50.7 K	$ 52.5 K	$ 54.3 K	$ 56.2 K	$ 58.2 K	$ 815.1 K	$ 843.6 K	$ 873.2 K	$ 903.7 K	$ 935.4 K		
$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K		
$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K	$ 0.0 K		
$ 810.0 K	$ 13.0 M	$ 13.5 M	$ 14.0 M	$ 14.4 M	$ 14.9 M	$ 4.4 M	$ 4.6 M	$ 4.7 M	$ 4.9 M	$ 5.0 M	$ 815.1 K	$ 843.6 K	$ 873.2 K	$ 903.7 K	$ 935.4 K		

2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Now	Year 1 - 5					Year 6 - 10					Year 11 - 15					Year 16 - 20				
$ 0.0 K	$ 3.6 M	$ 3.7 M	$ 3.8 M	$ 4.0 M	$ 4.1 M	$ 4.3 M	$ 4.4 M	$ 4.6 M	$ 4.7 M	$ 4.9 M	$ 5.1 M	$ 5.2 M	$ 5.4 M	$ 5.6 M	$ 5.8 M	$ 6.0 M	$ 6.2 M	$ 6.4 M	$ 6.7 M	$ 6.9 M
$ 0.0 K	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M
$ 0.0 K	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M	$ 1.9 M
$ 0.0 K	$ 2.4 M	$ 2.5 M	$ 2.5 M	$ 2.6 M	$ 2.7 M	$ 2.8 M	$ 2.9 M	$ 3.0 M	$ 3.1 M	$ 3.2 M	$ 3.3 M	$ 3.5 M	$ 3.6 M	$ 3.7 M	$ 3.8 M	$ 4.0 M	$ 4.1 M	$ 4.3 M	$ 4.4 M	$ 4.6 M

Asset Management Open-Source Toolkit

Operations and Maintenance

Operations and Maintenance

Failure Mode Causes	Failure Effect	Critical CoF							Risk Level	O&M Task	Mitigated PoF	Mitigated CoF	Mitigated Risk
What can cause this? Due to…	What are the consequences of this failure mode?	Evident?	S/C/P	Economic	Legal	Environmental	Safety	PoF 1-5					
Excess solids, unsuitable materials cause extended increase in power load, age	take pump offline, manual solids removal	Y	1	2		1	1	4	Medium	public information re: wet wipes & FOG, weekly inspection	2		Low
Improper scheduled maintenance	medium term shut down for in house repair	Y		1		1	1	4	Low	Replace seals every 10 years	2		Very Low
Excess power requirements from influent clogging trips breaker		Y		1		1	1	3	Low	Not required			Low
Excessive age	decrease in treatment efficiency	N				2		2	Low	Not required			Low

Operations assessment can be used to define your PoF in inventory

AIM network

Questions and Discussion

What is the most critical change needed in how we deliver services?

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